

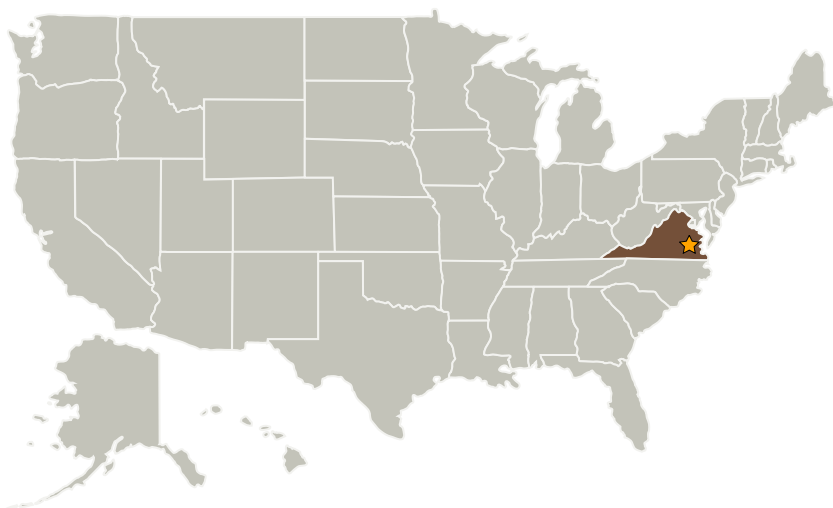
A Highly Integrated Multi-Parameter Distributed Fiber-Optic Instrumentation System, Phase I

Completed Technology Project (2006 - 2007)

Project Introduction

In the future, exploration missions will benefit greatly from advanced metrology capabilities, particularly structural health monitoring systems that provide real time in situ diagnostics and evaluation of structural integrity. Safety- and mission-critical components and systems will be instrumented with embedded sensors to provide a real-time indication of health, helping to ensure that America's space exploration remains safe and cost efficient. One of the most promising technologies for accomplishing this is fiber-optic sensors. Due to their light-weight and multiplexing potential, fiber-optic sensors are highly desirable for employment in this fashion. However, most COTS devices are bench sized units and are too large and heavy to be overly attractive for space applications. To address this shortcoming, Luna Innovations proposes to develop a compact, light-weight, low-power consumption, multi-parameter distributed sensor system based on the OFDR technique. The interrogator will incorporate optical ASIC technology, highly integrated tunable VCSEL technology, and state-of-the-art integrated processing technology to dramatically reduce the size, weight, and cost and to dramatically increase the performance and robustness relative to COTS OFDR interrogator units. This interrogator will interface with fiber-optic strain, temperature, and shape sensor arrays, enabling simultaneous interrogation of a multitude of sensors, dramatically reducing the per sensor cost of instrumentation.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Luna Innovations, Inc.	Supporting Organization	Industry	Roanoke, Virginia

Primary U.S. Work Locations

Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.4 Vehicle Systems
 - └ TX09.4.6 Instrumentation and Health Monitoring for EDL